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# Infantile Atrophy

I have selected this as the Subject of my thesis because of the great importance that attaches to it. Living as I do in a large working class neighbourhood, I have been impressed with the fact that a large number of children suffer from this affection and many die every year in our large towns.

Many of the lives might have been saved if proper means of prevention had been taken.

It is a striking fact that every year 140,000 children are born in this country,

to die before they reach the age  
of 12 months.

Not only is this the case but the  
vitality of those who survive  
is deteriorated by injudicious  
care & feeding. That this is  
so is proved by the fact that  
the standard of measurements  
for the British Army has been  
lately reduced to suit the  
defective physique of the recruits.  
The task which I have imposed  
upon myself in this paper is  
that of pointing out and suggesting  
methods whereby this great  
annual sacrifice of infant  
life may be prevented or  
lessened.

Infantile Atrophy is not a  
specific disease but rather

a condition of lowered vitality. It is a vice of nutrition and can, in most cases, be arrested at almost any period of its progress. It is almost <sup>un</sup>known in the well-to-do classes and is much rarer in the country than in towns. It is also very common in children's hospitals and foundling institutions. Holt has stated that in 44 hospitals for infants in New York with which he was connected it accounted for half the deaths.

The word comes from a privative, and τροφή nourishment and signifies not so much want of nourishment as the condition which results from defective

or improper feeding.  
Other names given to the  
condition are 'marasmus,'  
'cachexia' and 'food atrophy'.  
I do not propose to include  
in this paper any references to  
cases of atrophy which result  
from inherited syphilis or tubercu-  
lous disease nor those cases of gastro-  
intestinal disorder not directly  
connected with bad feeding.

Gastro-intestinal affections  
figure frequently on death  
certificates and they often  
bring about a fatal termination  
in cases where the child has  
suffered from infantile atrophy  
for some time. Both are likely  
to arise from the same cause  
viz - injudicious feeding and

Circumstances

circumstances in each case determine whether a child will perish from causes acting either on the mucous membrane of the Stomach - (gastric catarrh or gastritis) or those acting on that of the bowels - (enteritis or diarrhoea).

### Etiology

The cause of this affection may be summed up in a few words. viz - defective assimilation of food.

There is not often a criminal deprivation of food but the giving of food which is unsuitable for the age of the child either in quantity or quality. I have compiled a record of 83 fatal cases occurring in my

my practice here in Northampton,  
a large industrial town with  
a population of 89,863,  
in the ~~13~~<sup>13</sup> $\frac{1}{2}$  years between Oct.  
1889 and April 1903.

The total number of deaths  
of children of 1 yr. old and under  
certified by me in that period  
was 319.

This gives a proportion of 25.9%  
of cases of Infantile Atrophy  
in the total deaths.

Gastro-intestinal affections  
were present in 51 cases, many  
of them closely connected with  
the condition.

These two together make 134  
which is equal to 42% of the  
total deaths under 1 year old  
Age

The



The condition is most met with during the first few months of infantile existence, the suckling period when the digestive powers are feeble. In my 83 cases 69 or 83% were of age or under.

Sex.

The opinion that boys die more readily than girls is well borne out by statistics. Thus in Dr Ogley's English life table noted by R. Barker in the 10 years 1871-80 out of a million births there died before the age of 1 yr.

Males 158,583

Females 128,734.

To represent this in another way, Average number of deaths per 1000 births in England & Wales. 1871-80

Males 163

females 134.

In

In my own cases out of 319  
deaths from all causes under a year  
there were

Males 176 or 55%

females 143

from Infantile Atrophy

Males 44 or 58%

females 39

This is greater than the preponderance of male over female  
births as shown in the last  
table for 1902 (Registrar  
General's Abstract)

For the whole of Northamptonshire

51.7% male

48.3% female

It is well known to shepherds  
that young male lambs die  
more readily than female.  
I have not heard of any  
Satisfactory

satisfactory theory which accounts for the greater vitality of the female.

The same relative proportions are maintained throughout life up to the age of 75 years as may be seen from the table quoted by Parkes.

### Environment

444 or 53% of my cases were living in crowded courts with no through-passage of air or in crowded streets.

The absence of fresh pure air is a notable etiological factor in Northampton during the last few years many of these closed-in courts have been condemned and abolished by the Sanitary Authority

and

and in that period the death rate in infants under 1yr old has considerably fallen. For example

in 1897 it was 184.3 per 1000

in 1902 " " 145 " "

There is still room for improvement in this direction as the infant mortality is still higher than that of the 76 largest towns. (the latter being 135 per 1000).

During the period above mentioned the proportion of married women who work in factories during the day and leave their children to the care of others has considerably diminished.

But the birth rate of Northampton is lower than the average and it may be objected that this accounts

accounts for the high death rate  
as Dr. Farr pointed out.

To shew that this is not so I  
have compared the infantile  
death rate of other large towns  
which have a birth rate similar to  
~~that~~ that of Northampton

Vital Statistics for 1<sup>st</sup> Quarter of 1903

Towns	annual birth rate per 1000 living	Deaths of children under 1 yr to 1000 births
Northampton	23.2	145
Brighton	24.7	99
Bury	22.2	133
Huddersfield	22.6	132
Halifax	22.4	114
Bradford	23.7	136
Blackburn	24.2	181
70 largest towns	30.1	135

The only town that surpasses  
Northampton in the table is  
Blackburn

we

We may presume that there the conditions unfavourable to infant life such as density of population, unhealthy atmosphere, employment of married women in the cotton mills, etc. exist to a greater degree than in Northampton.

All the other towns are of comparatively recent origin, whereas Northampton has been a considerable town since 1068 and still contains a large proportion of old houses with low ceilings and small cubic capacity. These latter are, of course, let to the very poor at small rents. Improved sanitary conditions all over the country will partly account for the  
decided

decided reduction in the death rate amongst infants as for ex.

England & Wales	Children 1 yr & under
1897	156 per 1000
1902	135 " "

(see latest report of the Registrar General).

### Illegitimacy

This accounts indirectly for a considerable proportion of deaths every year.

Without taking into account criminal baby-farming cases which are dealt with by the strong arm of the law it may be mentioned that the mothers in such cases have less desire that their unwelcome offspring should live to perpetuate their shame. They are generally obliged

obliged to earn their living in some way and leave their children to be cared for by strangers who are often ignorant & incompetent to a degree and are very poorly paid for doing so.

Some of these infants have been born prematurely or with a vigour much less than the average.

11 of my cases (equal to 13.2%) were illegitimate.

### Feeding.

Of all causes this is the most potent. Great ignorance still unhappily prevails regarding the proper feeding of infants artificially, despite the increased facilities for education generally.

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In those instances in which the mother has sufficient breast milk the infants do well enough as a rule.

Even then one has often to warn them about giving the breast too frequently and thus setting up Catarrh of the Stomach or bowels. If the child is fatful, the breast is used to keep it quiet and a fresh supply of milk is taken into the Stomach before the last meal has been digested. This causes pain & more fatfulness and more is given with the result that matters are aggravated. The child in this way suffers from gastric catarrh, colic, sleeplessness or even convulsions.

all

all of which might be prevented by a little regulation of the nursing.

In some cases the mother's milk does not agree, although given at proper intervals, from some deviation in its composition from the normal standard.

Dr. Cheadle examined the milk in one such case by the microscope and found it to contain large granular corpuscles. Gustave Smith recommended in a case seen by him that the child should have barley water given to it before nursing with a perfectly satisfactory result.

Besides this, many young mothers cannot remain content to see their

their offspring thriving moderately.  
The constant complaint heard  
by the medical attendant is  
that 'the breast did not seem  
to satisfy it'.

They want to see the child  
look like a prize-fed animal  
and accordingly begin to give  
oatmeal, arrowroot, corn flour,  
fingers of bread dipped in sugar  
or biscuits before the child can  
digest these.

This causes the stomach to  
become irritable & sickness  
or diarrhea a result.

In 13 of my cases or 15.6 %  
it was noted that starchy  
food had been given or pure  
milk at too early an age.

In most cases of Infantile  
Atrophy

Atrophy, the child has been  
bottle-fed. At any time  
the artificial feeding of infants  
is a difficult matter - There are  
so many pitfalls to be avoided  
that only those who are carefully  
instructed can avoid them.  
Cow's milk is used in the  
vast majority of cases.

As its Casein is much denser  
than that of human milk  
it requires to be modified  
and rendered soft & flocculent.  
This is often done by barley water  
or lime water in proper proportions  
being added or simply by  
raising it to the boiling point.

The milk of the goat is very  
similar to that of the cow but  
the Casein of asses & mares

milk

milk is soft & flaky like that of human milk.

There are other differences between cows milk & human which are represented by the following table taken from Eustance Smith's work

	woman	cow
Casein & extractives	3.9%	5.5%
Butter	2.6 ..	3.6
Sugar	4.3	3.8
Salts	0.13	0.6
Water.	88.9	86.4

Analysis by MM. Vernois and Bequerel.

This may be compared with Gouff. Beranez quoted by Cheadle.

	woman	cow
Nitrogenous or protein elements	3.924	5.404
Hydrocarbon or fats	2.666	4.305
Carbohydrates	4.364	4.037
Salts	0.138	0.548
Water	88.908	85.706

Even when cow's milk is diluted with an equal quantity of water the proper proportion of fats and carbohydrates is not present and these require to be added.

Another cause of Infantile Atrophy is feeding on condensed milk. This often agrees well at first but if persevered with beyond about 6 weeks soon fails to nourish properly.

When diluted with 7 parts of water it is still too weak in both fat & proteins thus —

	human	condensed milk with 7 parts of water
Proteid elements	3.924	3.26
Fats	2.666	1.6
Carbohydrates	4.364	5.37
Salts	0.138	0.5
Water	88.908	89.27

There are few children who can do with condensed milk stronger than 1 in 24 parts at first so that, unless cream & meat juice are added, the amount of nutriment contained is still much below the standard.

It has also been shown by Cheadle that it lacks the anti-scorbutic element contained in fresh milk and tends to produce scurvy.

The large percentage of cane sugar it contains undergoes lactic acid fermentation and sets up considerable irritation.

The more milk is altered from the natural state the more likely is it to produce scurvy.

Other causes may be mentioned

such as

such as cleft palate which prevents the child sucking properly - sewage contaminated, too humid or too changeable atmosphere ~~and~~ the use of flannelette instead of wool or imperfect clothing.

### Morbid Anatomy.

In cases where the body has been examined there is found Thrush on the mouth. bedsores or erythema of the buttocks. There is an entire absence of fat in the body.

According to Purror there is fatty degeneration of the kidneys, lungs & brain and sometimes ulceration of the Stomach; rarely haemorrhage into the cranial cavities.



## Diagnosis

There is not usually much difficulty. The child is seen to fail in health & lose weight or make no progress.

Our chief care should be to exclude organic disease, syphilis or tuberculosis.

The diagnosis is confirmed when the child begins to thrive after proper measures are adopted.

## Symptoms

These only require a passing mention.

Wasting. This is the most important and is the one that generally first leads the mother to seek advice. A healthy child should gain at the rate

of 2 to 4 oz per week and should double its weight in the first six months. Medical practitioners might carry with them a pocket salters' spring such as is used by the officers of the Society for Prevention of Cruelty to Children. By means of a towel the child could be weighed at regular intervals. Say - a week - In a case depicted in Holt's work the weight of the infant at 10 months was 6 lbs. It had weighed at birth as much as 10 lbs.

Wrinkled dry & yellow skin which gives a characteristic "old man" look to the face

Drowsiness - in sucklings  
 it is noticed that they often  
 fall asleep while taking the  
 breast, a sure sign, according  
 to Estelle Smith, that the  
 milk is watery in quality.  
 Thirst - constant screaming  
 or whining with a feeble cry.  
 Rash may appear; lichen  
 streptoderma, urticaria or  
 erythema - This latter is  
 most characteristic and is  
 due to the acid character  
 of the motions. It is always  
 associated with 'white mouth'  
 in the lay mind and mothers  
 will often tell you that the  
 latter has "gone through"  
 the child. Purgatives are  
 sometimes given to accomplish

this end with anything but  
beneficial results to the  
child

I have also on several occasions  
seen purpura present on  
the body.

Bowels irritable, often distended  
with gas. There are intercurrent  
attacks of vomiting & diarrhoea  
with clay coloured stools of a  
fœtid character, mixed with  
green mucus.

Aphthae, stomatitis or thrush  
Anaemia: oedema of the  
feet which are also cold.

The temperature is subnormal;  
often only  $94^{\circ}$  F. in the rectum  
Twitchings & startings.

Convulsions are said by Sutherland  
Smith to be rare from this

Cause

Cause alone.

In rare instances Opisthotonus has been noticed from reflex spasm of the muscles of the neck.

### Prognosis

If the child has reached the age of 8 months it is good because the salivary & pancreatic secretions become active about that period.

It is grave when the temperature is subnormal or according to Angel money when thrush is present. Many women in this neighborhood have the notion that it is a certain sign of approaching death but I have distinct recollections of cases which have

recovered

recovered in which this was present to a extreme degree. Serious nervous disturbances such as convulsions, opisthotonus, "spurious hydrocephalus" or coma are of grave import. The same may be said of purpura.

If the child's surroundings and feeding can be modified in the manner suggested below we may generally expect recovery -

### Treatment

A wet nurse who is healthy and whose milk corresponds to the age of the child is a great boon in such cases but this is practically out of the question

as the vast majority of the  
cases occur among the <sup>the</sup>  
poor

The same remark applies to  
asses or mare's milk.

In London the former can  
be obtained but at a high  
price which is prohibitive.

If possible the mother should  
suckle her infant for at least  
a month. After that age it  
may be put on a mixture  
of boiled cow's milk, boiled  
water and freshly prepared barley  
water at a temperature of  
95° F. These three are to  
be mixed in equal parts at  
first, the proportion of cow's  
milk being gradually increased  
Young infants bear any  
sudden

sudden change in the food  
very badly.

The above preparation should  
be given from a boat shaped  
or oval feeding bottle without  
a tube which ~~are~~ <sup>can be</sup> supplied  
by Maw & Son or Allen and  
Hambury. The latter make  
is the best as both ends are  
covered with rubber which  
can be taken off and the  
whole of the interior can be  
thoroughly cleaned.

I recommend two bottles, ~~one~~  
to be allowed to soak in a  
solution of soda or borax  
when not in use.

Milk can be sterilised by  
being raised to the boiling  
point which is about



24 degrees above that of water  
viz 233° F.

Aymard's steriliser is very  
convenient. The milk  
should be so treated as soon  
as it arrives at the house.

Barley water can be prepared  
by the method recommended  
by Angel Mery as follows:-  
Two teaspoonfuls of Scotch or  
pearl barley are put into a  
bint of cold water. This  
is put on the fire and boiled  
down to  $\frac{2}{3}$  rds of its bulk  
and afterwards strained  
through muslin.

If diarrhoea be a prominent  
symptom lime water may  
be added in the proportions  
of 1 in 12 parts.

L.H.

If cows milk disagrees  
or if it cannot readily be  
procured of good quality,  
condensed milk may be  
tried for a time.

The Anglo-Swiss brand appears  
to me to be the best in the  
market - a teaspoonful &  
half a bottle of water.

It requires the addition of  
cream as already hinted.  
This can be got from the  
"Ideal" brand made by the  
same firm. It contains  
about 30% of cream and  
I have seen babies thrive  
well on it.

In severe cases milk in  
any form must be abandoned  
for a time and nothing

but

but barley water and meat  
juice given - Sometimes this  
requires to be given in teaspoon-  
-ful doses every  $\frac{1}{2}$  hour or so.  
Meat juice is prepared as  
follows. -

Free from fat and gristle  $\frac{1}{4}$  lb  
of fresh raw meat, chop fine  
& put into a cup or basin with  
just as much cold water  
as will cover it. Leave for  
half an hour, occasionally  
stirring it & squeezing the  
meat with the back of a spoon.  
Strain through muslin and  
sweeten slightly.

It has been my experience  
that this process takes too  
much time & trouble for most  
mothers of the poorer class

and

Therefore I recommend a proprietary preparation of meat juice known as "Bovinine".

It is nearly tasteless and is preserved with whiskey. It can be given in doses of 5 to 10 drops in each bottle or even more than that according to circumstances. A two ounce bottle can be procured for 1/- and will keep well for a considerable time. There is another preparation which I have recommended extensively during the last 18 years known as "white wine whey". It is prepared as follows. Put a breakfast cupful of new milk on the fire, as soon as it boils add a glass of food timer sherry, allow to boil for 1 minute  
Take

take off the fire and strain through muslin. Sweeten. The resultant yellowish serum can be given either pure or diluted with barley water.

I am satisfied that this preparation has saved life in not a few instances.

If food sherry is not used the coagulation does not take place satisfactorily and ~~too~~ much milk passes through the muslin. It should always be examined by the medical attendant to see that it is of the proper quality.

If there is a subnormal temperature, cold & livid extremities and a depressed fontanelle recourse must be had to

Brandy

Brandy. A good rule for its administration is to give 10 drops for every month of the child's age up to 3 months.

In certain cases the milk requires to be peptonised.

This can be done by using the "Zymine" powders of Burroughs Wellcome & Co. One of these is put into a pint of milk which is kept at blood heat for 10 minutes after which it is raised to the boil to stop further action of the ferment.

The "Peptogenic milk powder" of Fritchard is also serviceable. My experience of "Panopeptone" prepared by the same firm is limited but it appeared to act as an excellent restorative

Mention also may be made  
of Savory & Moore's peptonised  
condensed milk.

As the child recovers strength  
& vigour of digestion, milk &  
starchy foods, fine oatmeal  
or Savory & Moore's Food may  
be given. Amongst the <sup>number</sup> <sup>have</sup>  
of Infants Foods I kept to  
this one and find it suitable  
in almost every case, if made  
dilute at first.

Allen & Hanbury's Food No 1.  
2 and 3 are also excellent foods.  
For medicine a purgative  
is often advisable at the  
onset, either castor oil  
or fluid magnesia.

The most frequent prescription  
I have used contains 3 to 5  
grains

grains of Bicarbonate of Soda  
1/2 a minim of T. Unc. Bone, in  
Ag Cassiaumoni or ag inosofoni  
Liquor Arsenicalis is a valuable  
fastic sedative in drop doses  
or even half a drop. It is most  
useful in cases where there is  
enteric diarrhoea in which  
the food passes through the  
alimentary canal very soon  
after being swallowed.  
It may be given before food.  
Each symptom must be  
treated as it arises, for example  
Convulsions or worms.  
The blander preparations of  
Iron and Cod Liver oil are  
usually administered to  
"round off" the treatment  
every day whatever the weather  
be



be almost the child should be taken out into the open air for about an hour and should wear a flannel binder to guard against chills.

### Prophylaxis

This is of great moment in view of the national importance of the subject already adverted to. Instruction on the care and feeding of babies ought to be given to the older girls in public schools as a branch of domestic economy or evening classes like our present Ambulance classes held for the purpose in the evening so that young women at work might attend.

In France there have been established

established lately institutions  
for systematic instruction  
in these matters.

The girls are taught practically  
a great many matters useful to  
them in the household. A baby  
is washed, dressed & fed before  
their eyes to impress the lessons  
on their memories.

I am tempted in this  
connection to quote Horace—  
"Siquis irritant animos demissa  
per aures

Quam qual sunt oculis subjecta  
fidelibus et qual  
Ipse sibi tradit spectator."

In my opinion such measures  
would do much to remove the  
present gross ignorance which  
prevails and would save  
many

many young lives.

In cases where the parents are too poor to buy milk it should be the duty of the State to provide, free of charge, at convenient centres, pure milk sterilized which should be sent out in proper bottles with printed instructions as to its use.

This work might very well be undertaken by Boards of Guardians and a recommendation from the medical attendant insisted upon in each case.

It would also be possible to establish laboratories in connection with these where milk prescriptions of any strength of protein or fat

cont'd

could be made up.

Such laboratories exist in Boston, New York and other American cities. They were established by Rotch (see Archives of Pediatrics) in 1893.

The following solutions are used in them. —

1. Cream containing 16% offat
2. Separated milk from which the fat has been removed by the Centrifugal machine
3. A 20% standard solution of milk sugar.

The number of feedings in the 24 hours and the amount at each feeding are given out with the supply.

Milk prescriptions are now prepared by the Walker Sordano.

79 Duke St. London. W.

The Aylesbury Company  
also sends out what is  
described as humanized milk  
in glass bottles, properly  
sterilized.

I would also give prominence  
to the example that has  
been set to medical Officers  
of health by one in a district  
of London who sent out  
pamphlets broadcast  
among the people with  
short & clear instructions  
as to the care & feeding of  
infants.

District nurses who exist  
in almost every town of  
moderate size might undertake  
this in the course of their  
daily

daily visits

Laws ought to be passed making it punishable for mothers to go out to work and leave their children in the care of older children or incompetent persons.

Public crèches such as exist in Paris might be established where babies could be properly cared for at a nominal charge till the return of the mothers from work in the evening.

Whilst I do not disparage the excellent work done by the officers of the Society for the Prevention of Cruelty to Children I cannot but express my belief that they


each

could be made still more useful if their attention was more frequently directed to the young babies which are often made to suffer from the ignorance of their parents.

In cases of wilful neglect I have ~~often~~ witnessed a good effect produced in the neighbourhood by a conviction and there are those for whom this deterrent is necessary.

In conclusion, these latter measures, although not such as medical men could carry out themselves, are of such a far-reaching and beneficent nature that, in the carrying  
of them

42  
of them out the powers  
that be, would secure  
the hearty and loyal  
coöperation of the whole  
medical profession.

David Starr  
M.D., C.M.  


over  
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